Plant Cell Reports

Volume 6 1987

	For European Countries	*For Countries outside Europe*
Managing Editors	**Klaus Hahlbrock,** Köln, FRG	**Oluf L. Gamborg,** Fort Collins, CO, USA

Editors

N. Amrhein Zürich
W. Barz Münster
A. M. Boudet Toulouse
P. King Basel
H. Lörz Köln
P. Matile Zürich
L. Nover Halle
I. Potrykus Zürich
J. Schell Köln
E. W. Weiler Osnabrück
M. H. Zenk München
R. N. Beachy St. Louis
F. Constabel Saskatoon
E. D. Earle Ithaca
A. R. Gould Champaign
L. K. Grill Palo Alto
C. Harms Research Triangle Park
R. B. Horsch St. Louis
G. C. Phillips Las Cruces
C. Quiros Davis
M. Tabata Kyoto
I. K. Vasil Gainesville
J. M. Widholm Urbana

Springer International

Plant Cell Reports

Founded in 1981
by K. Hahlbrock and O. L. Gamborg

Copyright

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. This fee is US $ 0.20 per page, or a minimum of US $ 1.00 if an article contains fewer than five pages. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0721-7714, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Printers: Graphischer Betrieb Konrad Triltsch, D-8700 Würzburg

© Springer-Verlag Berlin Heidelberg 1987

Printed in Germany

Contents

Issue 1 appeared 16. 2. 1987
Issue 2 appeared 10. 4. 1987
Issue 3 appeared 4. 6. 1987
Issue 4 appeared 30. 7. 1987
Issue 5 appeared 22. 10. 1987
Issue 6 appeared 18. 12. 1987

Adams, D. O., see Robinson, K. E. P., et al. 405

Adler, J. H., see Ripa, P. V. 219

Afza, R., see Conger, B. V., et al. 345

Al-Atabee, J. S., Power, J. B.
Plant regeneration from protoplasts of *Dimorphoteca* and *Rudbeckia* 414

Alfermann, A. W., see Petersen, M., et al. 200

Ambid, C., see Cormier, F. 427

Anderson, L. A., Hay, C. A., Phillipson, J. D., Roberts, M. F.
Studies on *Ailanthus altissima* cell suspension cultures. Uptake of L-[methyl-^{14}C] methionine and incorporation of label into 1-methoxycanthin-6-one 242

Anderson, L. A., Roberts, M. F., Phillipson, J. D.
Studies on *Ailanthus altissima* cell suspension cultures. The effect of basal media on growth and alkaloid production 239

Andreu, F., see Tremouillaux-Guiller, J., et al. 375

Anthony, J. L., see Smith, R. H., et al. 60

Armitage, P., see Basiran, N., et al. 396

Arrillaga, I., Brisa, M. C., Segura, J.
Somatic embryogenesis from hypocotyl callus cultures of *Digitalis obscura* L. 223

Attree, S. M., see Bekkaoui, F., et al. 476

Attree, S. M., Bekkaoui, F., Dunstan, D. I., Fowke, L. C.
Regeneration of somatic embryos from protoplasts isolated from an embryogenic suspension culture of white spruce *(Picea glauca)* 480

Avalos, A., Vicente, C.
The occurrence of lichen phenolics in the photobiont cells of *Evernia prunastri* 74

Ayabe, S., Udagawa, A., Iida, K., Yoshikawa, T., Furuya, T.
Regulation of retrochalcone biosynthesis: Activity changes of O-methyltransferases in the yeast extract-induced *Glycyrrhiza echinata* cells 16

Bagga, S., Venkateswarlu, K., Sopory, S. K.
In vitro regeneration of plants from hypocotyl segments of *Amaranthus paniculatus* 183

Balsevich, J., see DeLuca, V., et al. 458

Bapat, V. A., Mhatre, M., Rao, P. S.
Propagation of *Morus indica* L. (Mulberry) by encapsulated shoot buds 393

Barnabas, B., Fransz, P. F., Schel, J. H. N.
Ultrastructural studies on pollen embryogenesis in maize (*Zea mays* L.) 212

Barnason, A., see Fry, J., et al. 321

Barsby, T. L., see Swanson, E. B., et al. 94

Barwale, U. B., Widholm, J. M.
Somaclonal variation in plants regenerated from cultures of soybean 365

Barz, W., see Keßmann, H. 55

Basiran, N., Armitage, P., Scott, R. J., Draper, J.
Genetic transformation of flax *(Linum usitatissimum)* by *Agrobacterium tumefaciens:* Regeneration of transformed shoots via a callus phase 396

Baszczynski, C. L., Kemble, R. J.
Terminal protein association and sequence homology in linear mitochondrial plasmidlike DNAs of sorghum and maize 127

Bates, G. W., see Nea, L. J. 337

Becwar, M. R., see Nagmani, R., et al. 157

Becwar, M. R., Noland, T. L., Wann, S. R.
A method for quantification of the level of somatic embryogenesis among Norway spruce callus lines 35

Bekkaoui, F., see Attree, S. M., et al. 480

Bekkaoui, F., Saxena, P. K., Attree, S. M., Fowke, L. C., Dunstan, D. I.
The isolation and culture of protoplasts from an embryogenic cell suspension culture of *Picea glauca* (Moench) Voss. 476

Benbadis, M. C., see Cañas, L. A., et al. 369

Berkowitz, G. A.
Chloroplast acclimation to low osmotic potential 208

Berthon, J. Y., Boyer, N., Gaspar, T.
Sequential rooting media and rooting capacity of *Sequoiadendron giganteum* in vitro. Peroxidase activity as a marker 341

Beversdorf, W. D., see Chuong, P. V., et al. 67

Beversdorf, W. D., see Swanson, E. B., et al. 94

Bino, R. J., Hille, J., Franken, J.
Kanamycin resistance during in vitro development of pollen from transgenic tomato plants 333

Borstel, K. v., see Toppel, G., et al. 466

Boyer, N., see Berthon, J. Y., et al. 341

Braemer, R. Paris, M.
Biotransformation of cannabinoids by a cell suspension culture of *Cannabis sativa* L. 150

Brisa, M. C., see Arrillaga, I., et al. 223

Brown, C., Lucas, J. A., Power, J. B.
Plant regeneration from protoplasts of a wild lettuce species (*Lactua saligna* L.) 180

Brown, S., see Menczel, L., et al. 98

Budimir, S., see Nešković, M., et al. 423

Cañas, L. A., Wyssmann, A. M., Benbadis, M. C.
Isolation, culture and division of olive (*Oleas europaea* L.) protoplasts 369

Carlson, J. A., see Wann, S. R., et al. 39

Carnes, M. G., see Wright, M. S., et al. 83

Caso, O. H., see Nigra, H. M., et al. 135

Chandler, S. F., Thorpe, T. A.
Proline accumulation and sodium sulfate tolerance in callus cultures of *Brassica napus* L. cv. Westar 176

Chang, W., see Chuang, M. 484

Chatterjee, G., see Sikdar, S. R., et al. 486

Chen, C.-C., see Lee, F.-M. 191

Chen, W. H., Gartland, K. M. A., Davey, M. R., Sotak, R., Gartland, J. S., Mulligan, B. J., Power, J. B., Cocking, E. C.
Transformation of sugarcane protoplasts by direct uptake of a selectable chimaeric gene 297

Chen, M. H., Wang, P. J., Maeda, E.
Somatic embryogenesis and plant regeneration in *Carica papaya* L. tissue culture derived from root explants 348

Chénieux, J.-C., see Petit-Paly, G., et al. 309

Chénieux, J.-C., see Tremouillaux-Guiller, J., et al. 375

Chowdhury, J. B., see Jain, R. K., et al. 382

Christofferson, S. E., see Shoemaker, R. C., e t al. 12

Chuang, M., Chang, W.
Somatic embryogenesis and plant regeneration in callus culture derived from immature seeds and mature zygotic embryos of *Dysosma pleiantha* (Hance) Woodson 484

Chuong, P. V., Pauls, K. P., Beversdorf, W. D.
Protoplast culture and plant regeneration from *Brassica carinata* Braun 67

Chyi, Y.-S., Phillips, G. C.
High effeciency Agrobacetrium-mediated transformation of *Lycopersicon* based on conditions favorable for regeneration 105

Cocking, E. C., see Chen, W. H., et al. 297

Cocking, E. C., see Yarrow, S. A., et al. 102

Cole, L., Coleman, J. O. D., Evans, D. E., Hawes, C. R., Horsley, D.
Antibodies to brain clathrin recognise plant coated vesicles 227

Coleman, J. O. D., see Cole, L., et al. 227

Collins, G. B., see Kysely, W., et al. 305

Conger, B. V., Novak, F. J., Afza, R., Erdelsky, K.
Somatic embryogenesis from cultured leaf segments of *Zea mays* 345

Constabel, F., see Eilert, J., et al. 271

Cormier, F., Ambid, C.
Extractive bioconversion of geraniol by *Vitis vinifera* cell suspension employing a two-phase system 427

Coté, G. G., Morse, M. J., Crain, R. C., Satter, R. L.
Isolation of soluble metabolites of the phosphatidyl-inositol cycle from *Samanea saman* 352

Coumans, M. P., see Swanson, E. B., et al. 94

Crain, R. C., see Coté, G. G., et al. 352

Creche, J., see Tremouillaux-Guiller, J., et al. 375

Cronauer-Mitra, S. S., Krikorian, A. D.
Aventitious shoot production from calloid cultures of banana 443

Czakó, M., see Purnhauser, L., et al. 1

Dalton, S. J., see Hale, A. D., et al. 435

Das, S., see Sikdar, S. R., et al. 486

Davey, M. R., see Chen, W. H., et al. 297

Davis, J. M., Keathley, D. E.
Differential responses to in vitro bud culture in mature *Robinia pseudoacacia* L. (black locust) 431

De Castro, D. C., see Wang, M.-S., et al. 294

DeLuca, V., Balsevich, J., Tyler, R. T., Kurz, W. G. W.
Characterization of a novel N-methyltransferase (NMT) from *Catharanthus roseus* plants. Detection of NMT and other enzymes of the indole alkaloid biosynthetic pathway in different cell suspension culture systems 458

DeLuca, V., see Eilert, U., et al. 271

Deno, H., Suga, C., Morimoto, T., Fujita, Y.
Production of shikonin derivatives by cell suspension cultures of *Lithospermum erythrorhizon.* VI. Production of shikonin derivatives by a two-layer culture containing an organic solvent 197

Dhawan, R. S., see Jain, R. K., et al. 382

DiCosmo, F., see Smith, J. I., et al. 142

Dix, P. J., see Purnhauser, L., et al. 1

Draper, J., see Basiran, N., et al. 396

Ducreux, G., see Sihachakr, D. 326

Dunstan, D. I., see Attree, S. M., et al. 480

Dunstan, D. I., see Bekkaoui, F., et al. 476

Eapen, S., see Köhler, F., et al. 313

Earle, E. D., see Robertson, D. 70

Ehwald, R., see Titel, C., et al. 473

Eilert, U., DeLuca, V., Kurz, W. G. W., Constabel, F.
Alkaloid formation by habituated and tumorous cell suspension cultures of *Catharanthus roseus* 271

Erdelsky, K., see Conger, B. V., et al. 345

Evans, D. E., see Cole, L., et al. 227

Ferwerda, M. A., see Pijnacker, L. P. 385

Fiedler, F., see Schumacher, H.-M., et al. 410

Finer, J. J.
Direct somatic embryogenesis and plant regeneration from immature embryos of hybrid sunflower (*Helianthus annuus* L.) on a high sucrose-containing medium 372

Fowke, L. C., see Attree, S. M., et al. 480

Fowke, L. C., see Bekkaoui, F., et al. 476

Fowke, L. C., see Hakman, I. 20

Fraley, R. T., see Hauptmann, R. M., et al. 265

Franken, J., see Bino, R. J., et al. 333

Fransz, P. F., see Barnabas, B., et al. 212

Fry, J., Barnason, A., Horsch, R. B.
Transformation of *Brassica napus* with *Agrobacterium tumefaciens* based vectors 321

Fujita, Y., see Deno, H., et al. 197

Fujita, Y., see Hara, Y., et al. 8

Fujita, Y., see Suzuki, T., et al. 194, 275, 279

Fukui, H., see Kobayashi, Y., et al. 185

Fukui, H., see Suzuki, M., et al. 260

Fukui, H., see Yamamoto, H., et al. 356

Fukui, H., see Yazaki, K., et al. 131

Furuya, T., see Ayabe, S., et al. 16

Furuya, T., see Yoshikawa, T. 449

Galbraith, D. W., see Shoemaker, R. C., et al. 12

Gartland, J. S., see Chen, W. H., et al. 297

Gartland, K. M. A., see Chen, W. H., et al. 297

Gaspar, T., see Berthon, J. Y., et al. 341

Girod, P.-A., Zyrd, J.-P.
Clonal variability and light induction of betalain synthesis in red beet cell cultures 27

Giuletti, A. M., see Nigra, H. M., et al. 135

Gladfelter, H. J., Phillips, G. C.
De novo shoot organogenesis of *Pinus eldarica* Medw. in vitro. I. Reproducible regeneration from long-term callus cultures 163

Gladfelter, H. J., see Wagley, L. M., et al. 167

Goodin, J. R., see Trolinder, N. L. 231

Goodman, R. M., see Steffensen, D. M., et al. 462

Golz, C., see Köhler, F., et al. 313

Gundlach, H., see Schumacher, H.-M., et al. 410

Guri, A., Volokita, M., Sink, K. C.
Plant regeneration from leaf protoplasts of *Solanum torvum* 302

Hahne, G., see Mayer, J. E., et al. 77

Hakman, I., Fowke, L. C.
An embryogenic cell suspension culture of *Picea glauca* (White spruce) 20

Hale, A. D., Pollock, C. J., Dalton, S. J.
Polysaccharide production in liquid cell suspension cultures of *Phleum pratense* L. 435

Hamill, J. D., see Robins, R. J., et al. 122

Hauptmann, R. M., Ozias-Akins, P., Vasil, V., Tabaeizadeh, Z., Rogers, S. G., Horsch, R. B., Vasil, I. K., Fraley, R. T.
Transient expression of electroporated DNA in monocotyledonous and dicotyledonous species 265

Hara, Y., Morimoto, T., Fujita, Y.
Production of shikonin derivatives by cell suspension cultures of *Lithospermum erythrorhizon.* V. Differences in the production between callus and suspension cultures 8

Hara, Y., see Suzuki, T., et al. 194

Harms, C. T., see Widholm, J. M. 138

Hartmann, T., see Toppel, G., et al. 466

Hatano, K., Shoyama, Y., Nishioka, I.
Somatic embryogenesis and plant regeneration from the anther of *Aconitum carmichaeli* Debx. 446

Hawes, C. R., see Cole, L., et al. 227

Hawes, M. C., Pueppke, S. G.
Correlation between binding of *Agrobacterium tumefaciens* by root cap cells and susceptibility of plants to crown gall 287

Hay, C. A., see Anderson, L. A., et al. 242

Hellmig, A., see Titel, C., et al. 473

Hille, J., see Bino, R. J., et al. 333

Hinchee, M. A., see Wright, M. S., et al. 83

Horsch, R. B., see Fry, J., et al. 321

Horsch, R. B., see Hauptmann, R. M., et al. 265

Horsley, D., see Cole, L., et al. 227

Hosfield, G. L., see Saunders, J. W., et al. 46

Hoyos, R., see Szabados, L., et al. 248

Huizing, H. J., see Paul, H., et al. 379

Hunsinger, H., Schauz, K.
Induction of pistil-like structures in suspension-derived callus cultures of wheat *(Triticum aestivum)* 363

Iida, K., see Ayabe, S., et al. 16

Ikeda, T., Takanami, Y., Imaizumi, S., Matsumoto, T., Mikami, Y., Kubo, S.
Formation of antiplant viral protein by *Mirabilis jalapa* L. cells in suspension culture 216

Imaizumi, S., see Ikeda, T., et al. 216

Jacobsen, H.-J., see Kysely, W., et al. 305

Jacobsen, H.-J., see Stirn, S. 50

Jain, R. K., Dhawan, R. S., Sharma, D. R., Chowdhury, J. B.
Salt-tolerance and proline accumulation: a comparative study in salt-tolerant and wild type cultured cells of eggplant 382

Johnson, M. A., see Wann, S. R., et al. 39

Jouanneau, J. P., see Leguay, J. J. 235

Junker, B., Zimny, J., Lührs, R., Lörz, H.
Transient expression of chimaeric genes in dividing and nondividing cereal protoplasts after PEG-induced DNA uptake 329

Kato, Y., see Suzuki, T., et al. 279

Katterman, F. R., see Saka, K. et al. 470

Kaufman, R. J., see Wright, M. S., et al. 83

Kaul, K.
Plant regeneration from cotyledon-hypocotyl explants of *Pinus strobus* L. 5

Keathley, D. E., see Davis, J. M. 431

Keen, B., see Mottley, J. 389

Kemble, R. J., see Baszczynski, C. L. 127

Kerns, H. A., see Smith, R. H., et al. 60

Keßmann, H., Barz, W.
Accumulation of isoflavones and pterocarpan phytoalexins in cell suspension cultures of different cultivars of chickpea *(Cicer arietinum)* 55

Kikuma, M., see Yazaki, K., et al. 131

Kobayashi, Y., Fukui, H., Tabata, M.
An immobilized cell culture system for berberine production by *Thalictrum minus* cells 185

Köhler, F., Golz, C., Eapen, S., Kohn, H., Schieder, O.
Stable transformation of moth bean *Vigna aconitifolia* via direct gene transfer 313

Kohn, H., see Köhler, F., et al. 313

Kool, A. J., see Tan, M.-L. M. C., et al. 172

Krens, F. A., see Paul, H., et al. 379

Krikorian, A. D., see Cronauer-Mitra, S. S. 443

Kubo, S., see Ikeda, T., et al. 216

Kurz, W. G. W., see DeLuca, V., et al. 458

Kurz, W. G. W., see Eilert, U., et al. 271

Kurz, W. G. W., see Smith, J. I., et al. 142

Kysely, W., Myers, J. R., Lazzeri, P. A., Collins, G. B., Jacobsen, H.-J.
Plant regeneration via somatic embryogenesis in pea (*Pisum sativum* L.) 305

Lark, K. G., see Quemada, H., et al. 63

Lazzeri, P. A., see Kysely, W., et al. 305

Lee, F.-M., Chen, C.-C.
Nuclear fusion in cultured microspores of barley 191

Lee, R. Y., see Robinson, K. E. P., et al. 405

Leeuwangh, J. E., see Paul, H., et al. 379

Leguay, J. J., Jouanneau, J. P.
Patterns of protein synthesis in dividing and auxin-starved soybean cell suspensions. Differential expression of a major group of M_r-17 000 peptides 235

Leistner, E., see Yamamoto, H., et al. 187

Levi, A., see Saunders, J. W., et al. 46

Lörz, H., see Junker, B., et al. 329

Lucas, J. A., see Brown, C., et al. 180

Lührs, R., see Junker, B., et al. 329

Maddock, S. E.
Suspension and protoplast culture of hexaploid wheat (*Triticum aestivum* L.) 23

Maeda, E., see Chen, M. H., et al. 348

Maliga, P., see Menczel, L., et al. 98

Manners, J. M.
Transformation of *Stylosanthes* spp. using *Agrobacterium tumefaciens* 204

Mano, Y., see Noda, T., et al. 283

Marrewijk, G. A. M. van, see Tan, M.-L. M. C., et al. 172

Marsh, E., see Michelmore, R., et al. 439

Márton, L., see Purnhauser, L., et al. 1

Mascarenhas, A. F., see Muralidharan, E. M. 256

Mathias, R. J., Mukasa, C.
The effect of cefotaxime on the growth and regeneration of callus from four varieties of barley (*Hordeum vulgare* L.) 454

Matsui, C., see Noda, T., et al. 283

Matsumoto, T., see Ikeda, T., et al. 216

Mayer, J. E., Hahne, G., Palme, K., Schell, J.
A simple and general plant tissue extraction procedure for two-dimensional gel electrophoresis 77

McCoy, T. J.
Tissue culture evaluation of NaCl tolerance in *Medicago* species: Cellular versus whole plant response 31

McCoy, T. J.
Characterization of alfalfa (*Medicago sativa* L.) plants regenerated from selected NaCl tolerant cell lines 417

McGrath, M., see Quiros, C. F., et al. 114

Medgyesy, P., see Purnhauser, L., et al. 1

Menczel, L., Morgan, A., Brown, S., Maliga, P.
Fusion-mediated combination of Ogura-type cytoplasmic male sterility with *Brassica napus* plastids using X-irradiated CMS protoplasts 98

Mercy, S. T., Zapata, F. J.
Position of anthers at plating and its influence on anther callusing in rice 318

Mhatre, M., see Bapat, V. A., et al. 393

Michelmore, R., Marsh, E., Seely, S.
Transformation of lettuce *(Lactuca sativa)* mediated by *Agrobacterium tumefaciens* 439

Mikami, Y., see Ikeda, T., et al. 216

Misawa, M., see Smith, J. I., et al. 142

Montagu, M., see Petit-Paly, G., et al. 309

Morgan, A., see Menczel, L., et al. 98

Morimoto, T., see Deno, H., et al. 197

Morimoto, T., see Hara, Y., et al. 8

Morse, M. J., see Coté, G. G., et al. 352

Motoyoshi, F., see Nishiguchi, M., et al. 90

Mott, R. L., see Vuke, T. M. 153

Mottley, J., Keen, B.
Indirect assessment of callus fresh weight by non-destructive methods 389

Mukasa, C., see Mathias, R. J. 454

Mulligan, B. J., see Chen, W. H., et al. 297

Muralidharan, E. M., Mascarenhas, A. F.
In vitro plantlet formation by organeogenesis in *E. camaldulensis* and by somatic embryogenesis in *Eucalyptus citriodora* 256

Myers, J. R., see Kysely, W., et al. 305

Nabeshima, S., see Noda, T., et al. 283

Nagarajan, P., Walton, P. D.
A comparison of somatic chromosal instability in tissue culture regenerants from *Medicago media* Pers. 109

Nagmani, R., Becwar, M. R., Wann, S. R.
Single-cell origin and development of somatic embryos in *Picea abies* (L.) Karst. (Norway spruce) and P. glauca (Moench) Voss (white spruce) 157

Nakagawa, K., see Suzuki, M., et al. 260

Nea, L. J., Bates, G. W.
Factors affecting protoplast electrofusion efficiency 337

Nešković, M., Vujičić, R., Budimir, S.
Somatic embryogenesis and bud formation from immature embryos of buckwheat (*Fagopyrum esculentum* Moench.) 423

Nigra, H. M., Caso, O. H., Giulietti, A. M.
Production of solasodine by cally from different parts of *Solanum eleagnifolium* Cav. plants 135

Nishiguchi, M., Sato, T., Motoyoshi, F.
An improved method for electroporation in plant protoplasts: infection of tobacco protoplasts by tobacco mosaic virus particles 90

Nishioka, I., see Hatano, K., et al. 446

Noda, T., Tanaka, N., Mano, Y., Nabeshima, S., Ohkawa, H., Matsui, C.
Regeneration of horseradish hairy roots incited by *Agrobacterium rhizogenes* infection 283

Noland, T. L., see Becwar, M. R., et al. 35

Noland, T. L., see Wann, S. R., et al. 39

Novak, F. J., see Conger, B. V., et al. 345

Ohkawa, H., see Noda, T., et al. 283

Ozias-Akins, P., see Hauptmann, R. M., et al. 265

Palme, K., see Mayer, J. E., et al. 77

Paris, M., see Braemer, R. 150

Parr, A. J., see Robins, R. J., et al. 122

Parr, A. J., see Walton, N. J., et al. 118

Paul, H., Zijlstra, C., Leeuwangh, J. E., Krens, F. A., Huizing, H. J.
Reproduction of the beet cyst nematode *Heterodera schachtii* Schm. on transformed root cultures of *Beta vulgaris* L. 379

Pauls, K. P., see Chuong, P. V., et al. 67

Petersen, M., Alfermann, A. W., Reinhard, E., Seitz, H. U.
Immobilization of digitoxin 12β-hydroxylase, a cytochrome P-450-dependent enzyme from cell cultures of *Digitalis lanata* EHRH 200

Petit-Paly, G., Montagu, M., Viel, C., Rideau, M., Chénieux, J.-C.
Dihydrofuro[2,3-b]quinolinium alkaloids in cultured cells of *Ptelea trifoliata* L. Isolation of a new alkaloid, ptelecultinium 309

Phillips, G. C., see Chyi, Y.-S. 105

Phillips, G. C., see Gladfelter, H. J. 163

Phillips, G. C., see Wagley, L. M., et al. 167

Phillipson, J. D., see Anderson, L. A., et al. 242, 239

Pijnacker, L. P., Ferwerda, M. A.
Karyotype variation in aminoethylcysteine resistant cell and callus cultures and regenerated plants of a dihaploid potato *(Solanum tuberosum)* 385

Pollock, C. J., see Hale, A. D., et al. 435

Power, J. B., see Al-Atabee, J. S. 414

Power, J. B., see Brown, C., et al. 180

Power, J. B., see Chen, W. H., et al. 297

Power, J. B., see Yarrow, S. A., et al. 102

Pratt, L. H., see Raikhel, N. V. 146

Pueppke, S. G., see Hawes, M. C. 287

Purnhauser, L., Medgyesy, P., Czakó, M., Dix, P. J., Márton, L.
Stimulation of shoot regeneration in *Triticum aestivum* and *Nicotiana plumbaginifolia* Viv. tissue cultures using the ethylene inhibitor $AgNO_3$ 1

Quemada, H., Roth, E. J., Lark, K. G.
Changes in methylation of tissue cultured soybean cells detected by digestion with the restriction enzymes HpaII and MspI 63

Quiros, C. F., McGrath, M., Stites, J. L.
Use of stem proteins and isozymes for the identification of celery varieties 114

Raikhel, N. V., Pratt, L. H.
Wheat germ agglutinin accumulation in coleoptiles of different genotypes of wheat. Localization by monoclonal antibodies 146

Raina, S. K., Sathish, P., Sarma, K. S.
Plant regeneration from in vitro cultures of anthers and mature seeds of rice (*Oryza sativa* L.) cv. Basmati-370 43

Rao, P. S., see Bapat, V. A., et al. 393

Reinhard, E., see Petersen, M., et al. 200

Rhodes, M. J. C., see Robins, R. J., et al. 122

Rhodes, M. J. C., see Walton, N. J., et al. 118

Rideau, M., see Petit-Paly, G., et al. 309

Rideau, M., see Tremouillaux-Guiller, J., et al. 375

Riebesehl, B., see Toppel, G., et al. 466

Rietveld, E. M., see Tan, M.-L. M. C., et al. 172

Ripa, P. V., Adler, J. H.
Sterol conjugates of two phenotypically different calli of *Beta vulgaris* 219

Roberts, M. F., see Anderson, L. A., et al. 239, 242

Robertson, D., Earle, E. D.
Nitro-blue tetrazolium: A specific stain for photosynthetic activity in protoplasts 70

Robins, R. J., Hamill, J. D., Parr, A. J., Smith, K., Walton, N. J., Rhodes, M. J. C.
Potential for use of nicotinic acid as a selective agent for isolation of high nicotineproducing lines of *Nicotiana rustica* hairy root cultures 122

Robins, R. J., see Walton, N. J., et al. 118

Robinson, K. E. P., Adams, D. O., Lee, R. Y.
Differential physiological and morphological responses of inbred lines to the ethylene precursor l-aminocyclopropane-l-carboxylic acid by cultured *Helianthus annuus* (sunflower) shoot tips 405

Roca, W., see Szabados, L., et al. 248

Rogers, S. G., see Hauptmann, R. M., et al. 265

Romani, R., see Yamaki, S. 244

Roth, E. J., see Quemada, H., et al. 63

Saka, K., Katterman, F. R., Thomas, J. C.
Cell regeneration and sustained division of protoplasts from cotton (*Gossypium hirsutum* L.) 470

Sankara Rao, K., see Venkateswara, R., et al. 291

Sarma, K. S., see Raina, S. K., et al. 43

Satish, P., see Raina, S. K., et al. 43

Sato, T., see Nishiguchi, M., et al. 90

Sato, F., Takeda, S., Yamada, Y.
A comparison of effects of serveral herbicides on photoautotrophic, photomixotrophic and heterotrophic cultured tobacco cells and seedlings 401

Satter, R. L., see Coté, G. G., et al. 352

Saunders, J. W., Hosfield, G. L., Levi, A.
Morphogenetic effects of 2,4-dichlorophenoxyacetic acid on pinto bean (*Phaseolus vulgaris* L.) leaf explants in vitro 46

Saxena, P. K., see Bekkaoui, F., et al. 476

Schauz, K., see Hunsinger, H. 363

Schel, J. H. N., see Barnabas, B., et al. 212

Schell, J., see Mayer, J. E., et al. 77

Schieder, O., see Köhler, F., et al. 313

Schumacher, H.-M., Gundlach, H., Fiedler, F., Zenk., M. H.
Elicitation of benzophenanthridine alkaloid synthesis in *Eschscholtzia* cell cultures 410

Scott, R. J., see Basiran, N., et al. 396

Seely, S., see Michelmore, R., et al. 439

Segura, J., see Arrillaga, I., et al. 223

Seitz, H. U., see Petersen, M., et al. 200

Sen, S. K., see Sikdar, S. R., et al. 486

Sharma, D. R., see Jain, R. K., et al. 382

Shoemaker, R. C., Christofferson, S. E., Galbraith, D. W.
Storage protein accumulation patterns in somatic embryos of cotton (*Gossypium hirsutum* L.) 12

Shoyama, Y., see Hatano, K., et al. 446

Sihachakr, D., Ducreux, G.
Plant regeneration from protoplast culture of sweet potato (*Ipomoea batatas* Lam.) 326

Sikdar, S. R., Chatterjee, G., Das, S., Sen, S. K.
Regeneration of plants from mesophyll protoplasts of the wild crucifer *Eruca sativa* Lam. 486

Sink, K. C., see Guri, A., et al. 302

Smart, N. J., see Smith, J. I., et al. 142

Smith, J. I., Smart, N. J., Misawa, M., Kurz, W. G. W., Tallevi, S. G., DiCosmo, F.
Increased accumulation of indole alkaloids by some cell lines of *Catharanthus roseus* in response to addition of vanadyl sulphate 142

Smith, K., see Robins, R. J., et al. 122

Smith, R. H., Kerns, H. A., Anthony, J. L., Wild, J. R.
Methotrexate and aminopterin effects on growth and regeneration in *Daucus carota* 60

Sopory, S. K., see Bagga, S., et al. 183

Sotak, R., see Chen, W. H., et al. 297

Steffensen, D. M., Wilson, H. J., Goodman, R. M.
In situ detection of early replication phases of a gemini virus in legume protoplasts 462

Stirn, S., Jacobsen, H.-J.
Marker proteins for embryogenic differentiation patterns in pea callus 50

Stites, J. L., see Quiros, C. F., et al. 114

Suga, C., see Deno, H., et al. 197

Suga, Y., see Yamamoto, H., et al. 356

Suzuki, M., Nakagawa, K., Fukui, H., Tabata, M.,
Relationship of berberine-producing capability between *Thalictrum* plants and their tissue cultures 260

Suzuki, M., see Yamamoto, H., et al. 356

Suzuki, T., Yoshioka, T., Hara, Y., Tabata, M., Fujita, Y.
A new bioassay system for screening high berberine-producing cell colonies of *Thalictrum minus* 194

Suzuki, T., Yoshioka, T., Kato, Y., Fujita, Y.
A new estimation method for plant cell viability by determining electron transport activity 279

Suzuki, T., Yoshioka, T., Tabata, M., Fujita, Y.
Potential of *Datura innoxia* cell suspension cultures for glucosylating hydroquinone 275

Swanson, E. B., Coumans, M. P., Wu, S. C., Barsby, T. L., Beversdorf, W. D.
Efficient isolation of microspores and the production of microspore-derived embryos from *Brassica napus* 94

Szabados, L., Hoyos, R., Roca, W.
In vitro somatic embryogenesis and plant regeneration of cassava 248

Tabaeizadeh, Z., see Hauptmann, R. M., et al. 265

Tabata, M., see Kobayashi, Y., et al. 185

Tabata, M., see Suzuki, T., et al. 194, 275, 260

Tabata, M., see Yamamoto, H., et al. 187, 356

Tabata, M., see Yazaki, K., et al. 131

Takanami, Y., see Ikeda, T., et al. 216

Takeda, S., see Sato, F., et al. 401

Tallevi, S. G., see Smith, J. I., et al. 142

Tan, M.-L. M. C., Rietveld, E. M., Marrewijk, G. A. M. van, Kool, A. J.
Regeneration of leaf mesophyll protoplasts of tomato cultivars *(L. esculentum):* factors important for efficient protoplast culture and plant regeneration 172

Tanaka, N., see Noda, T., et al. 283

Thomas, J. C., see Saka, K., et al. 470

Thorpe, T. A., see Chandler, S. F. 176

Titel, C., Ehwald, R., Zoglauer, K., Hellmig, A.
A parenchymatic medium solidifier for plant in vitro culture 473

Toppel, G., Witte, L., Riebesehl, B., Borstel, K. v., Hartmann, T.
Alkaloid patterns and biosynthetic capacity of root cultures from some pyrrolizidine alkaloid producing *Senecio* species 466

Tremouillaux-Guiller, J., Andreu, F., Creche, J., Chenieux, J.-C., Rideau, M.
Variability in tissue cultures of *Choisya ternata.* Alkaloid accumulation in protoclones and aggregate clones obtained from established strains 375

Trolinder, N. L., Goodin, J. R.
Somatic embryogenesis and plant regeneration in cotton (*Gossypium hirsutum* L.) 231

Tyler, R. T., see DeLuca, V., et al. 458

Udagawa, A., see Ayabe, S., et al. 16

Uijtewaal, B. A.
Ploidy variability in greenhouse cultured and in vitro propagated potato *(Solanum tuberosum)* monohaploids (2n = x = 12) as determined by flow cytometry 252

Vaidyanathan, C. S., see Venkateswara, R., et al. 291

Vasil, I. K., see Hauptmann, R. M., et al. 265

Vasil, V., see Hauptmann, R. M., et al. 265

Venkateswara, R., Sankara Rao, K., Vaidyanathan, C. S.
Cryptosin – a new cardenolide in tissue culture and intact plants of *Cryptolepis buchanani* Roem. & Schult. 291

Venkateswarlu, K., see Bagga, S., et al. 183

Viel, C., see Petit-Paly, G., et al. 309

Vicente, C., see Avalos, A. 74

Volokita, M., see Guri, A., et al. 302

Vujičić, R., see Nešković, M., et al. 423

Vuke, T. M., Mott, R. L.
Growth of loblolly pine callus on a variety of carbohydrate sources 153

Wagley, L. M., Gladfelter, H. J., Phillips, G. C.
De novo shoot organogenesis of *Pinus eldarica* Medw. in vitro. II. Macro- and micro-photographic evidence of de novo regeneration 167

Walton, N. J., Parr, A. J., Robins, R. J., Rhodes, M. J. C.
Toxicity of quinoline alkaloids to cultured *Cinchona ledgeriana* cells 118

Walton, N. J., see Robins, R. J., et al. 122

Walton, P. D., see Nagarajan, P. 109

Wang, A. S.
Callus induction and plant regeneration from maize mature embryos 360

Wang, P. J., see Chen, M. H., et al. 348

Wang, M.-S., Zapata, F. J., De Castro, D. C.
Plant regeneration through somatic embryogenesis from mature seed and young inflorescence of wild rice (*Oryza perennis* Moench) 294

Wann, S. R., see Becwar, M. R., et al. 35

Wann, S. R., Johnson, M. A., Noland, T. L., Carlson, J. A.
Biochemical differences between embryogenic and nonembryogenic callus of *Picea abies* (L.) Karst. 39

Wann, S. R., see Nagmani, R., et al. 157

Ward, D. V., see Wright, M. S., et al. 83

Widholm, J. M., see Barwale, U. B. 365

Widholm, J. M., Harms, C. T.
Dominant expression of an amino-acid uptake deficiency in carrot somatic fusion hybrids 138

Wild, J. R., see Smith, R. H., et al. 60

Wilson, H. J., see Steffensen, D. M., et al. 462

Witte, L., see Toppel, G., et al. 466

Wright, M. S., Ward, D. V., Hinchee, M. A., Carnes, M. G., Kaufman, R. J.
Regeneration of soybean (*Glycine max* L. Merr.) from cultured primary leaf tissue 83

Wu, S. C., see Swanson, E. B., et al. 94

Wyssmann, A. M., see Cañas, L. A., et al. 369

Yamada, Y., see Sato, F., et al. 401

Yamaki, S., Romani, R.
Vacuolar yield and alteration with aging of suspension-cultured cells from pear fruit 244

Yamamoto, H., Suzuki, M., Suga, Y., Fukui, H., Tabata, M.
Participation of an active transport system in berberine-secreting cultured cells of *Thalictrum minus* 356

Yamamoto, H., Tabata, M., Leistner, E.
Cytological changes associated with induction of anthraquinone synthesis in photoautotrophic cell suspension cultures of *Morinda lucida* 187

Yarrow, S. A., Cocking, E. C., Power, J. B.
Plant regeneration from cultured cell-derived protoplasts of *Pelargonium aridum,* P. x *hortorum* and P. *peltatum* 102

Yazaki, K., Fukui, H., Kikuma, M., Tabata, M.
Regulation of shikonin production by glutamine in *Lithospermum erythrorhizon* cell cultures 131

Yoshikawa, T., see Ayabe, S., et al. 16

Yoshikawa, T., Furuya, T.
Saponin production by cultures of *Panax ginseng* transformed with *Agrobacterium rhizogenes* 449

Yoshioka, T., see Suzuki, T., et al. 194, 275, 279

Zapata, F. J., see Mercy, S. T. 318

Zapata, F. J., see Wang, M.-S., et al. 294

Zenk, M. H., see Schumacher, H.-M., et al. 410

Zijlstra, C., see Paul, H., et al. 379

Zimny, J., see Junker, B., et al. 329

Zoglauer, K., see Titel, C., et al. 473

Zyrd, J.-P., see Girod, P.-A. 27

Announcements 82, 160

Erratum 161